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LOWER HOUSATONIC RIVER BASIN
SEYMOUR, CONNECTICUT

PEAT SWAMP RESERVOIR DAM
CT 00088

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST 1978

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
Lower Housatonic River Basin
Seymour, Conn.
Peat Swamp Reservoir Dam

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam consists of two types of embankments. The right portion, 202 ft. in length, consists of a concrete core wall with up and downstream berms. The crest is 20 ft. in width and side slopes are 2 horizontal to 1 vertical both up and downstream. The left portion, 318 ft. in length, consists of concrete and rubble masonry core with up and downstream berms. The dam is judged to be in good condition. Based upon the size and hazard classification in accordance with Corps guidelines the test flood will be equal to the Probable Maximum Flood.

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LOWER HOUSATONIC RIVER BASIN
SEYMOUR, CONNECTICUT

PEAT SWAMP RESERVOIR DAM
CT 00088

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

AUGUST 1978

BRIEF ASSESSMENT

PHASE I INSPECTION REPORT

NATIONAL PROGRAM OF INSPECTION OF DAMS

Inventory Number:	CT 00088
Name of Dam:	PEAT SWAMP RESERVOIR
State Located:	CONNECTICUT
County Located:	NEW HAVEN
Town Located:	SEYMOUR
Stream:	BEAVER BROOK
Date of Inspection:	MAY 24, 1978
Inspection Team:	MIKE HORTON
	HECTOR MORENO
	GONZALO CASTRO
	DEAN THOMASSON

The dam consists of two types of embankments. The right portion, 202 feet in length, consists of a concrete core wall with up and downstream berms. The crest is 20 feet in width and side slopes are 2 horizontal to 1 vertical both up and downstream. The left portion, 318 feet in length, consists of concrete and rubble masonry core with up and downstream berms. The crest is 10 feet in width and side slopes are 2 horizontal to 1 vertical both up and downstream. The concrete ogee weir is 19 feet in length and is located adjacent to the left abutment. The spilling channel curves right and water flows into a culvert drop inlet for approximately 100 feet and exits into an aeration pond. In addition to normal runoff, from the forested undeveloped drainage area, there are four diversions from nearby brooks, which feed the reservoir. There is one 8 inch low level intake which exits directly into the drop inlet and one 12 inch feed to the aeration pond. There are two more reservoirs downstream in the two miles between Peat Swamp Reservoir and the City of Ansonia.

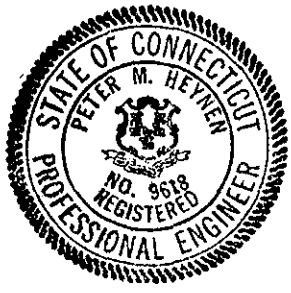
Based upon the visual inspection at the site, review of available information and the past performance of the dam, the dam is judged to be in good condition. But the inspection did reveal numerous areas requiring minor maintenance. Refer to Section 7 for more detail.

Based upon the size (intermediate) and hazard (high) classification in accordance with Corps guidelines the test flood will be equal to the Probable Maximum Flood. The spillway capacity is 600 cubic feet per second, which is in excess of 90% of the Test Flood. Peak inflow to the reservoir is 1600 cubic feet per second. Peak outflow (test flood) is 640 cubic feet per second with the dam being overtopped 0.10 feet. The spillway will pass nearly 90% of the Test Flood.

The peak failure outflow, if the dam breached, would be 43,500 cubic feet per second. The average stage one and one half miles downstream to Quillinan Reservoir would be 15.0 feet for a reach outflow of 36,000 cubic feet per second. Quillinan Reservoir Dam would be overtopped by 8.0 feet and probably breach. Even without breaching Quillinan Reservoir, the 15 foot wave would sweep down the Beaver Brook Valley through residential Ansonia, 500 feet below Quillian Reservoir causing the potential for excessive economic loss and loss of life.

In as much as the spillway will pass nearly 90% of the Test Flood we do not feel that more refined hydrologic studies are necessary. However, minor construction activity can minimize further deterioration of portions of the downstream face of the dam and its adjacent embankment. Also, the outlet valve locations should be shifted to the upstream face of the dam. An operation and maintenance plan should be instituted as described in Section 7.

The above recommendations should be instituted within one year of the owner's receipt of this Phase I Inspection Report.



Peter M. Heynen, P.E.
Project Manager
Cahn Engineers, Inc.

William O. Doll, P.E.
Chief Engineer
Cahn Engineers, Inc.

This Phase I Inspection Report on Peat Swamp Reservoir Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

SAUL C. COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspection. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionarly in nature. It would be incorrect to assume that the present condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions there of. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as neccessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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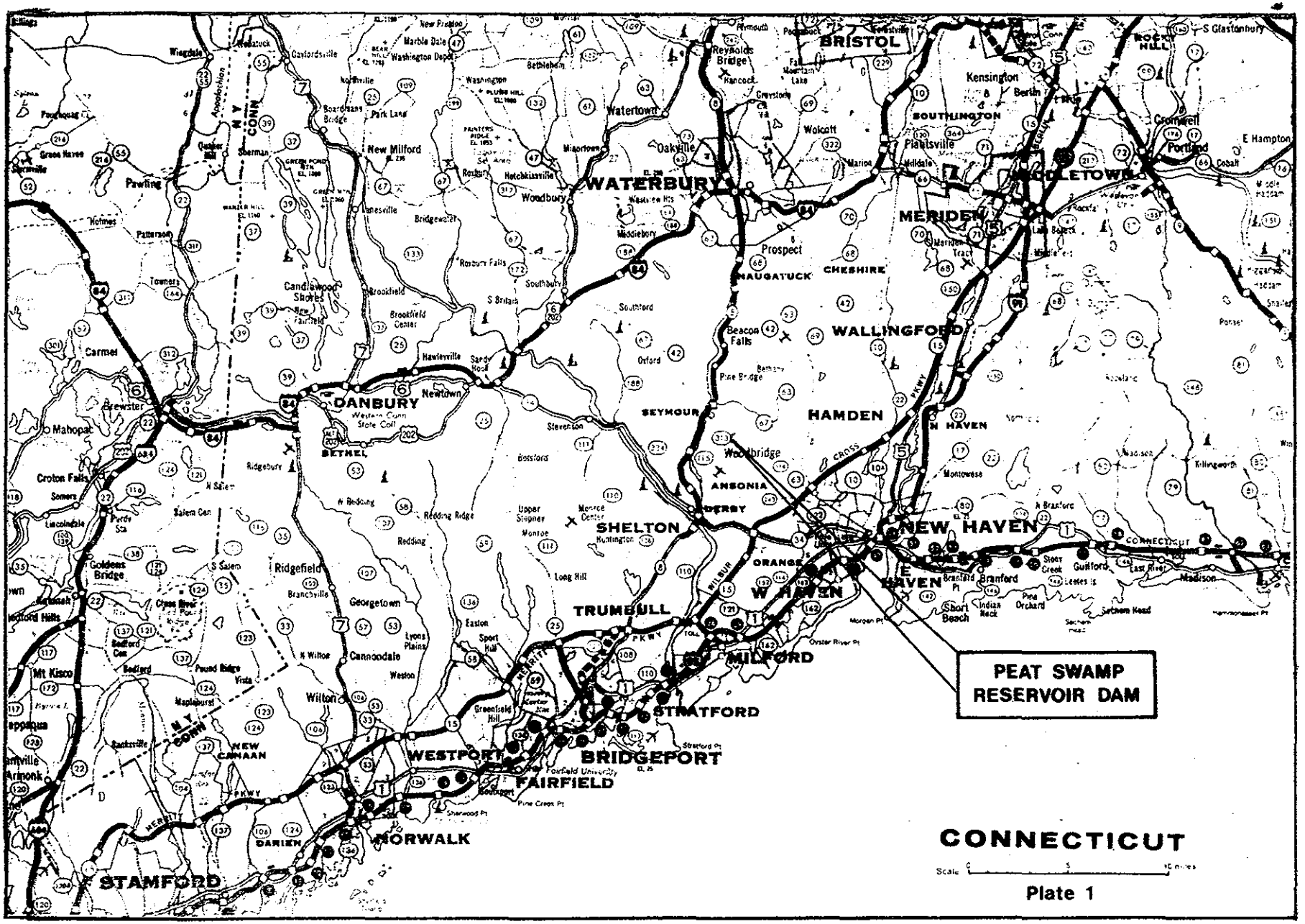
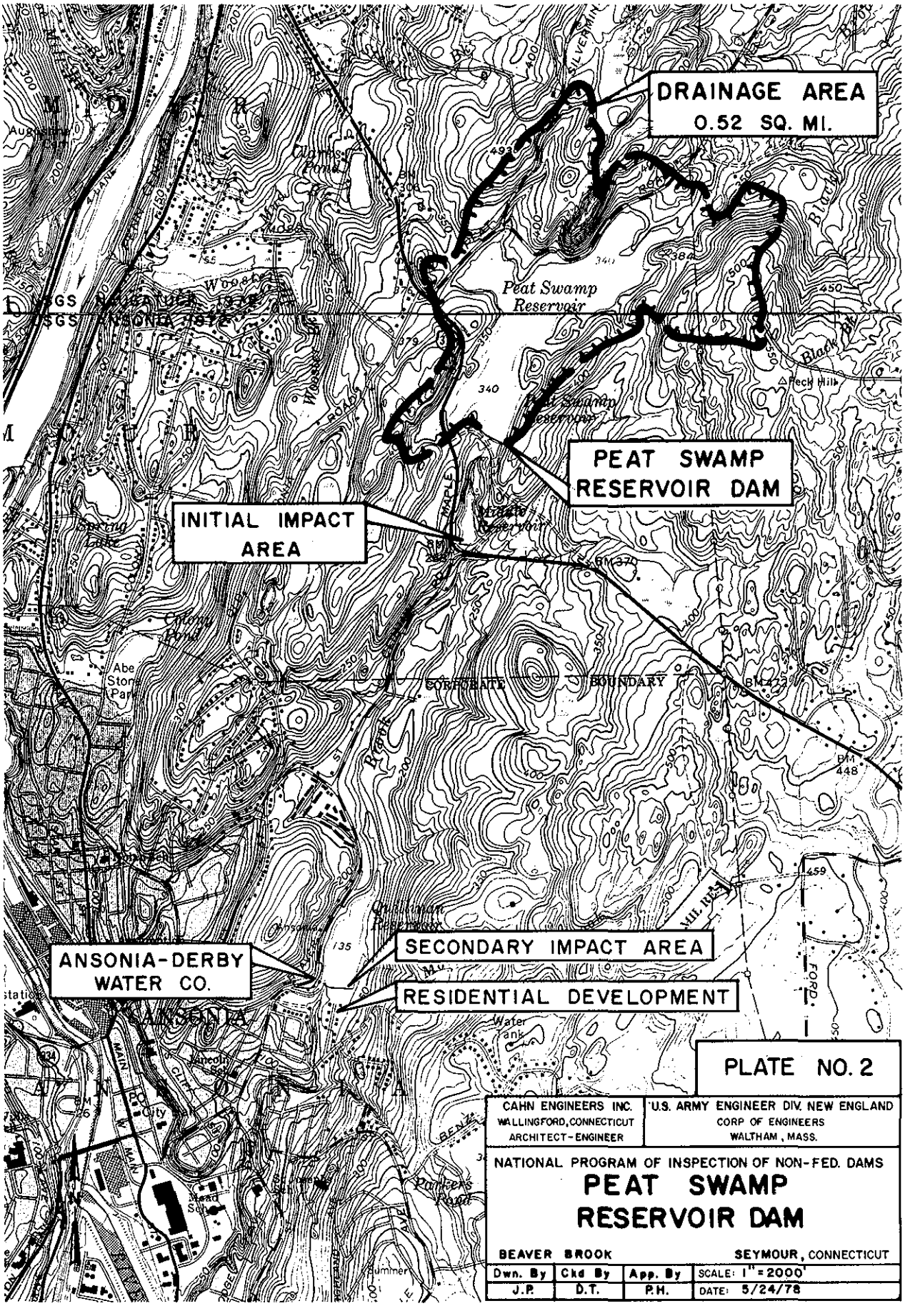
Peat Swamp Reservoir Dam
Inventory No. CT 00088
Report Date: December 10, 1973

*See Special Note Appendix Section B - Availability of Data

OVERVIEW PHOTO

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS. CAHN ENGINEERS. INC. WALLINGFORD, CONN. ARCHITECT —— ENGINEER	NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS	PEAT SWAMP RESERVOIR DAM BEAVER BROOK	SEYMOUR CONNECTICUT	DATE 5/24/78 CE # 27 531 GB PAGE 6x


PEAT SWAMP
RESERVOIR DAM
CONNECTICUT
Scale
Plate 1


DRAINAGE AREA
0.52 SQ. MI.
PEAT SWAMP
RESERVOIR DAM
INITIAL IMPACT
AREA
SECONDARY IMPACT AREA
ANSONIA-DERBY
WATER CO.
RESIDENTIAL DEVELOPMENT
Peat Swamp
Reservoir
CORPORATE BOUNDARY
ANSONIA
DERBY
PLATE NO. 2
CAHN ENGINEERS INC.
WALLINGFORD, CONNECTICUT
ARCHITECT-ENGINEER
U.S. ARMY ENGINEER DIV. NEW ENGLAND
CORP OF ENGINEERS
WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS
PEAT SWAMP
RESERVOIR DAM
BEAVER BROOK
SEYMOUR, CONNECTICUT
Dwn. By J.P.
Ckd By D.T.
App. By P.H.
SCALE: 1" = 2000'
DATE: 5/24/78

PHASE I INSPECTION REPORT

PEAT SWAMP RESERVOIR DAM

SECTION I

PROJECT INFORMATION

1.1 General

a. Authority - Public Law 92-367, August 8, 1972 authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Cahn Engineers, Inc. has been retained by the New England Division to inspect and report on selected dams in the southwestern portion of the State of Connecticut. Authorization and notice to proceed were issued to Cahn Engineers, Inc. under a letter of April 26, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0310 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection Program - The purposes of the program are to:

(1) Perform technical inspection and evaluation non-federal dams to identify conditions requiring correction in a timely manner by non-Federal interests.

(2) Encourage and prepare the States to quickly initiate effective dam inspection programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

c. Scope of Inspection Program - The scope of this Phase I inspection report includes:

(1) Gathering, reviewing and presenting all available data as can be obtained from the owners, previous owners, the state and other associated parties.

(2) A field inspection of the facility detailing the visual condition of the dam, embankments and appurtenant structures.

(3) Computation concerning the hydraulics and hydrology of the facility and its relationship to the calculated flood through the existing spillway.

(4) An assessment of the condition of the facility and corrective measures required.

It should be noted that the report does not pass judgement on the safety or stability of the dam other than on a visual basis. The intent of the inspection program is to alert concerned parties of apparent necessary corrective action requirements or further investigation recommendations.

1.2 Description of Project

a. Description of Dam and Appurtenances - The dam consists of two types of embankments. The right portion, 202 feet in length, consists of a concrete corewall with up and downstream berms. The crest is 20 feet in width and side slopes are 2 horizontal to 1 vertical both up and downstream. The left portion, 318 feet in length, consists of concrete and rubble masonry core with up and downstream berms. The crest is 10 feet in width and side slopes are 2 horizontal to 1 vertical both up and downstream. The concrete ogee weir is 19 feet in length and is located adjacent to the left abutment. The spillway channel curves right and water flows into a culvert drop inlet for approximately 100 feet and exits into an aeration pond. In addition to normal runoff, from the forested undeveloped drainage area, there are four diversions from nearby brooks, which feed the reservoir. There is one 8 inch low level intake which exits directly into the drop inlet and one 12 inch feed to the aeration pond. In the 1½ miles downstream from the dam to Ansonia there are two more reservoirs.

b. Location - The dam is located on Beaver Brook in a rural area in the Town of Seymour, County of New Haven, State of Connecticut. The dam is shown on the Ansonia U.S.G.S. Quadrangle Map having coordinates of longitude W73° 03'35" and latitude of N41° 22'12".

c. Size Classification - Intermediate (Height 42.0'), (Storage 1990 Ac. Ft.).

d. Hazard Classification - High (Category 1, Residential Ansonia located 2 miles downstream). There is a potential for loss of life and property in the event the dam is breached. Utilizing the April 1978 "Rule of Thumb Guidance for Estimating Downstream Dam Failure Hydrographs", he peak failure outflow from the dam would be 43,500 cfs (Appendix D-10). The average stage one and one half miles downstream to Quillinan Reservoir would be 15' for a reach outflow of 36,000 cfs (Appendix D-12). Quillinan Reservoir dam would be overtopped by 8' and probably breach. Even without breaching Quillinan Reservoir, the 15 foot wave would sweep down the Beaver Brook Valley through residential Ansonia 500 feet below Quillinan Reservoir, causing severe damage to life and property.

e. Ownership - Ansonia-Derby Water Company
230 Beaver Street
Ansonia, Connecticut 06401
Mr. Fred Elliott (203) 735-1888

f. Purpose of Dam - Public water supply.

g. Design and Construction History - The following information is believed to be accurate based on available plans and correspondence.

Prior to 1895 there may have been two periods of dam construction. The first period dam is known to exist immediately upstream and at the toe of the present dam. The second period dam consisted of masonry rubble with earth embankment on each side with a central spillway.

During the period between 1895 and 1916, several proposals were submitted to the Ansonia Water Company for raising the second period dam. The 1916 "As Built" drawing for the Ansonia Water Company indicates that the raising consisted of adding a concrete wall and buttresses on top of the rubble wall and extending the dam by construction of 180 feet of concrete corewall and earth embankments. The spillway was relocated to the left of the dam. The engineer and contractor are unknown.

In 1925 the dam was raised again with the addition of concrete to the main dam and the corewall. The spillway was also raised but its location and channel remained the

same. This work was done for the Ansonia Water Company and engineered by Albert B. Hill. The contractor is unknown. There is no evidence of additional construction after 1925 other than normal maintenance. The Ansonia Water Company is presently known as the Ansonia-Derby Water Company.

h. Normal Operational Procedures - Valves are operated as needed during the summer months to supply water to downstream reservoirs when the flow no longer tops the spillway.

1.3 Pertinent Data

a. Drainage Area - 0.52 square miles.

b. Discharge at Damsite - Maximum Flood Not Known
Total Spillway Capacity at Top of Dam Elevation - 600 cfs.

c. Elevation - (Ft. above MSL, U.S.G.S. Datum)

Top of Dam:	347
Spillway Crest:	343
Streambed @ Center Line of Dam:	305
8" Low Level Intake:	306
12" Feed to Aeration Pond:	Unknown

d. Reservoir - Length of Normal Pool: 3000 ft

Length of Pool Elevation 347: 3000+ ft

e. Storage - Normal Pool: 1660 acre ft

Top of Dam Pool: 1990 acre ft

f. Reservoir Surface - Normal Pool: 82.1 acres

Top of Dam Pool: 82.1 + acres

g. Dam - Type: Concrete and rubble masonry core. Earth embankment up and downstream.

Length: Dam: 318 ft.
Corewall: 202 ft.

Height: 42'

Top Width:	10' Minimum - Dam 20' Maximum-Corewall
Sideslope:	2H to 1V upstream. 2H to 1V downstream.
Impervious Core:	Concrete and masonry rubble.
Cutoff:	Foundation on rock both dam and corewall.

h. Diversion and Regulatory Tunnel - Not Applicable

i. Spillway - Type: Concrete ogee weir.

Length of Weir:	19 feet
Crest Elevation:	343
Upstream Channel:	2H to 1V earth.
Downstream Channel:	8H to 1V concrete and asphalt.

j. Regulatory Outlets - 8" Low Level intake
12" Feed to aeration pond

The 8" low level intake and 12" feed to the aeration pond are both mechanically operated. They are both located in the downstream side of the dam. See Plate #3 for their locations.

SECTION 2: ENGINEERING DATA

2.1 Design

a. Available Data - The available data consists of drawings and correspondence provided by the State of Connecticut and the owner.

b. Design Features - The maps and drawings indicate the design features stated previously herein.

c. Design Data - There were no engineering values, assumptions, test results or calculations available for the original construction or later raisings.

2.2 Construction

a. Available Data - "As Built" drawings were available and are included in the Appendix Section 2 for the 1916 and 1925 raisings. No other construction estimates or reports were available.

b. Construction Considerations - No construction consideration information was available.

2.3 Operation - Daily lake level readings have been taken on this dam since 1951. The maximum recorded water over the spillway was 7 inches during January 26 to 28, 1952. The operator, who has been with the dam for 23 years, has not seen the dam spillway capacity exceeded.

2.4 Evaluation

a. Availability - Existing data was provided by the State of Connecticut and the owner. The owner made the operations available for visual inspection.

b. Adequacy - Due to the limited amount of detailed engineering data available (except for the plans, all records were lost in the 1955 flood), the final assessment of this investigation must be based primarily on visual inspection, performance history, hydraulic computations of spillway capacity and approximate hydrologic computations.

c. Validity - The drawings and correspondence portray the dam substantially as observed during the field inspection.

SECTION 3: VISUAL INSPECTION

3.1 Findings

a. General - The general appearance of the dam is good. Close inspection reveals many areas requiring minor maintenance.

b. Dam - The dam is composed of two sections, a corewall earth embankment on the right and a concrete rubble masonry dam with downstream and upstream earth berms on the left.

b.1 Corewall Embankment Dam Section

Upstream Slope - The upstream slope was completely submerged, since the reservoir was slightly over the spillway crest and only the upper part of the upstream face of the corewall was visible. Thus the condition of the earth upstream slope could not be inspected.

Crest - The crest of the dam consists of the top of the core wall, 4 ft wide, and the top of the downstream earth embankment, 16 ft. wide. There are no cracks and no erosion or footpaths in the earth section.

Downstream Slope - The portion of the downstream slope from the crest of the edge of the road is grassed and does not show any sloughing, erosion or wet spots. There are several small trees and bushes growing in the slope. Below the road the slope is heavily wooded, and it is difficult to observe. In this wooded area at the toe of the slope, there is a seep discharging along what appears to be an old stream channel. The water appears clean, and there is no evidence of silt deposition in the area immediately downstream of the seep. Some of the flow travels underground through the gravely bottom of the old stream bed, and thus flow estimates cannot reliably be made.

b.2 Concrete/Rubble Masonry Dam Section with Earth Berms

Upstream Berm - The upstream berm could not be inspected because it was under water.

Downstream Berm - The downstream berm is generally in good condition with no sloughing or wet spots noted. There are a few holes made by burrowing animals on the slope and against the concrete wall at the edges of the concrete buttresses. A leak in the concrete wall at the

construction joint between the original dam and the 1925 top section was observed at the first two arched sections to the right of the spillway. The leak falls on the crest and seeps into the downstream berm. As a result, the ground is soft at the crest of the downstream berm. There are no visible wet areas on the berm slope or downstream of it. There is, however, a 4-in. pipe, which discharges a small flow into the culvert drop inlet and which may be a toe drain for the section of the downstream berm between the drop inlet and the spillway. The water discharged by the 4-in. pipe is clear except for yellowish-colored algae which apparently grows in the pipe.

c. Appurtenent Structures and Downstream Channel - The spillway channel is in good condition. Low concrete walls are also in good condition. There are a few obstructions on the bottom of the channel consisting of a couple of tree branches and some grass growing at the inside of the curve of the channel where flow velocities are small. The spillway channel discharges into a drop inlet for the culvert that connects with the aeration pool farther downstream. The drop inlet has stone walls which are in good condition.

d. Reservoir Area - The area surrounding the reservoir is undeveloped and heavily forested. No erosion or sedimentation problems are known to exist.

3.2 Evaluation

Based on the visual inspection the dam appears in good condition. A seep exists at the downstream toe of the corewall-embankment dam section, but the water is clear, even though the flow is significant. A seep which does not carry solids in suspension is not necessarily an unsafe condition. Turbidity of the water and/or large changes in flow volume can, however, indicate erosion and loss of soil. The seep is in an area which is heavily wooded, and thus it is not easy for maintenance personnel to periodically inspect it for quantity and turbidity.

The spillway channel contained little debris and obstructions on the bottom, and it is important that it be maintained in this manner because the culvert drop inlet is small and can be clogged very easily. However, if it did clog, or overflow during high spillway flows, it would just wash out the access road below the dam.

SECTION 4: OPERATIONAL PROCEDURES

4.1 Regulating Procedures

No regulating procedures exist for this dam other than those necessary for maintaining adequate public water supply. These procedures include brook diversions into the reservoir and providing water to downstream reservoirs, as needed.

4.2 Maintenance of Dam

The dam is visited daily for the water level readings and maintenance when needed is reported. During the growing season the grass is cut regularly; periodically brush is cut on the downstream face.

4.3 Maintenance of Operating Facilities

The maintenance of the operating facilities is on an as needed basis. The valves are generally operated at least twice a year, once in the spring and again in the fall. The valves are greased at least once a year.

4.4 Description of Any Warning System in Effect

No formal warning system is in effect. The dam operator reports emergency situations directly to his supervisor. Depending on the situation the supervisor notifies his engineer or the State Police and the Seymour Police Departments.

4.5 Evaluation

Maintenance procedures should be continued on a regular basis.

SECTION 5: HYDRAULIC/HYDROLOGIC

5.1 Evaluation of Features

a. Design Data - No computations could be found for the original dam construction or later raisings.

b. Experience Data - Water generally flows over the spillway from late fall to early summer. The maximum water level over the spillway between 1951 and present was recorded to be 7 inches during January 26 to 28, 1952. The water level for both August and October 1955 were lower.

c. Visual Observations - On the date of inspection the spillway was clear and unobstructed. The spillway is not spanned by a bridge so that the possibility of debris collection is minimal. The spillway empties into a drop inlet at the toe of the dam which could easily clog with debris. As a result of any blockage the access road would be washed out.

d. Overtopping Potential - The recommended spillway design flood for this high hazard intermediate size dam is the Probable Maximum Flood (PMF). Based upon "Preliminary Guidance for Estimating Maximum Probable Discharges" March 1978, peak inflow to the reservoir is 1600 cfs (Appendix D-1); peak outflow (Test Flood) is 640 cfs with the dam overtopped 0.10' (Appendix D-7). Based upon the size and hazard classification in accordance with Corps guidelines the test flood will be equal to the PMF.

Since the watershed area (0.52 square miles) of Peat Swamp is smaller than two square miles, it may be appropriate to consider higher intensity short duration storms. One such calculation is shown in Appendix D-16.

e. Spillway Adequacy - The spillway will pass in excess of 90 percent of the Test Flood at elevation 347 (top of dam).

SECTION 6: STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) There are holes at contact of earth embankment and base of concrete dam possibly caused by seepage at the contact between top of old rubble wall and base of concrete raising.

(2) There are indications of vertical settlement/movement at the two monoliths adjacent to and to the right of the spillway. This is indicated at the spillway wing walls where they abut the above monoliths. The relative movement varies between 1/4 and 1/2 inches.

(3) Spillway structure shows no signs of stability problems.

(4) Significant seepage at junction between 1916 and 1925 raisings most notable immediately to the right of the spillway.

b. Design and Construction Data - The design and construction data available are not sufficient to formally evaluate the stability of the dam. In particular, there is no information available concerning the zonation, if any, of the earth sections nor the foundation material for the corewall or for the rubble masonry wall with concrete buttresses. The drawings indicate that the corewall and the rubble masonry wall with buttresses were placed in an excavation to rock.

Long term stability could be affected by continued deterioration at the horizontal construction joints due to seepage and freeze-thaw action.

c. Operating Records - There is no evidence that any stability problems have occurred during the operational history.

d. Post Construction Changes - No other post construction changes were evidenced other than the 1916 and 1925 raisings. All previous comments refer to the dam after 1925.

e. Seismic Stability - This dam is in Seismic Zone 1 and hence does not have to be evaluated for seismic stability, according to the USCE Recommended Guidelines.

SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition - Based upon the visual inspection at the site, review of available information and the past performance of the dam, the dam is judged to be in good condition. However, the inspection did reveal numerous areas requiring minor maintenance.

Based upon our hydraulic computations, the spillway capacity is 600 cubic feet per second. Based upon "Preliminary Guidance for Estimating Maximum Probable Discharges" dated March 1978, peak inflow to the reservoir is 1600 cubic feet per second. The Test Flood is 640 cubic feet per second with the dam being overtopped 0.10 feet.

The spillway will pass in excess of 90% of the Test Flood.

b. Adequacy of Information - The information available is not sufficient to analyze the stability of the dam. Thus the assessment of the dam presented in this report was entirely based on a review of available information and a visual inspection. Such an inspection cannot disclose all possible potential problems that the dam may develop in the future.

c. Urgency - The recommendations and remedial measures presented in Sections 7.2 and 7.3 should be implemented within one year of the owner's receipt of this Phase I Inspection Report.

d. Need for Additional Information - There is a need for additional information as described in Section 7.2.

7.2 Recommendations

1. A study of the exact location, extent and nature of downstream concrete face deterioration should be made. The same type of study should be made for the embankment.

2. The spalled areas of the dam and spillway both on the top and vertical exposed faces should be repaired.

3. All vertical and horizontal construction joints should be repaired and sealed to minimize leakage. The seepage taking place through the construction joints in the

concrete wall between the 1925 addition and the 1916 addition and in the vicinity of the spillway can eventually cause instability of the downstream berm if the volume of the flow were to increase. The horizontal construction joint should be sealed.

4. The embankment holes should be repaired.

5. The dam outlet valves should be shifted to housing on the upstream face of the dam.

7.3 Remedial Measures

a. Alternatives - This study has identified no practical alternatives to the recommendations.

b. Operation and Maintenance Procedures - An operation and maintenance plan should be instituted to include the following:

(1) The area near the existing seep at the toe of the corewall embankment section of the dam should be cleared of trees and bushes for easy inspection.

(2) The seep should be visually examined for quantity and for presence of suspended solids at least twice a year and after unusually high reservoir levels or heavy rainstorms. Photographs taken during the inspections will facilitate comparison with previous conditions. Any evidence of suspended solids in the water or a sudden change in volume of flow not related to a proportional change in reservoir elevation should be considered as an indication of a possible unsafe condition.

(3) Settlement and/or horizontal movement of the monoliths adjacent to the spillway should be monitored horizontally and vertically for a period of one year to establish that no movement is occurring and semi-annually thereafter.

(4) Round the clock surveillance should be provided by the owner during periods of unusally heavy precipitation. The owner should develop a formal system with local officials for warning downstream residents in case of emergency.

APPENDIX

SECTION A: VISUAL OBSERVATIONS

VISUAL INSPECTION CHECK LIST

PARTY ORGANIZATION

PROJECT Peat Swamp

DATE: May 24, 1978

TIME: 8:30 a.m.

WEATHER Rain - 60°F

W.S. ELEV. 343.2 U.S. 306 DN.S

PARTY:	INITIALS:	DISCIPLINE:
1. Mike Horton	MH	Structural
2. Hector Moreno	HM	Hydraulic
3. Gonzalo Castro	GC	Geotechnical
4. Dean Thomasson	DT	Party Chief
5.		
6.		

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Concrete Core and Earth Embankment	DT/MH/GC	
2.	Concrete/Rubble Wall with Earth Berms	DT/GC/MH	
3.	Spillway	DT/MH/GC	
4.	Outlet Works - Transition and Conduit	DT	
5.	Reservoir	DT	
6.	Operation and Maintenance	DT	
7.	Safety and Performance Instrumentation	DT	
8.			
9.			
10.			
11.			
12.			

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp DATE May 24, 1978

PROJECT FEATURE Concrete Core and Earth Dam Embankment

AREA EVALUATED	BY	CONDITION
Concrete Structure		
Crest Elevation	DT	343
Current Pool Elevation	DT	343.2
Maximum Impoundment to Date	DT	Seven (7) inches over spillway. January 26 to 28, 1952.
General Condition of Concrete Surfaces	MH	Good.
Condition of Joints	MH	Good.
Spalling	MH	Yes - Top surface at construction joints.
Visible Reinforcing	MH	No.
Rusting or Staining of Concrete	MH	No.
Any Seepage or Efflorescence	MH	No.
Joint Alignment	MH	Good.
Cracking	MH	No.
Rusting or Corrosion of Steel	MH	No.
Erosion or Cavitation		
Alignment of Monoliths		
Numbering of Monoliths		
Differential Settlement		
Condition of Structure Foundation		
Structure Additions		
Differential Settlement		

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp DATE May 24, 1978

PROJECT FEATURE Concrete Core and Earth Dam Embankment

AREA EVALUATED	BY	CONDITION
Earth Fill		
Surface Cracks	GC	None observed.
Lateral Movement	GC	None apparent.
Vertical Alignment	GC	Appears satisfactory.
Horizontal Alignment	GC	Appears satisfactory.
Condition at Abutment and at Concrete Structures	GC	Good.
Indications of Movement of Structural Items on Slopes	GC	No structural items on D.S. slope.
Trespassing on Slopes	GC	None significant.
Sloughing or Erosion of Slopes or Abutments	GC	None apparent.
Rock Slope Protection - Riprap Failures	GC	U.S. slope under water, not visible.
Unusual Movement or Cracking at or near Toes	GC	None observed.
Unusual Embankment or Downstream Seepage	GC	One seep at D.S. toe at maximum cross section, water is clear.
Piping or Boils	GC	None apparent.
Foundation Drainage Features	GC	None observed or shown in drawings.
Toe Drains	GC	None observed or shown in drawings.
Instrumentation System	GC	None known.
Condition at Joint in Concrete Section	DT	Good.
Vegetation	GC	Grass mostly on upper part of D.S. slope and heavily wooded below road.

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp DATE May 24, 1978

PROJECT FEATURE Concrete/Rubble Wall with Earth Berms

AREA EVALUATED	BY	CONDITION
Crest Elevation	DT	343
Current Pool Elevation	DT	343.2
Maximum Impoundment to Date	DT	Seven (7) inches over spillway.
Surface Cracks	GC	None on D.S. earth berm.
Pavement Condition	GC	N/A.
Movement or Settlement of Crest	GC	None apparent for D.S. earth berm.
Lateral Movement	GC	None apparent.
Vertical Alignment	GC	Appears satisfactory.
Horizontal Alignment	GC	Appears satisfactory.
Condition at Abutment and at Masonry Structures	GC	Good.
Indications of Movement of Structural Items on Slopes	GC	No structural items on D.S. slope.
Trespassing of Slopes	GC	Holes by burrowing animals on D.S. slope.
Slouqhing or Erosion of Slopes or Abutments	GC	None observed.
Rock Slope Protection - Riprap Failures	GC	U.S. berm under water, not visible.
Unusual Movement or Cracking at or near Toes	GC	None observed.
Unusual Embankment or Downstream Seepage	GC	No seepage through earth berm observed.
Piping or Boils	GC	None observed.
Foundation Drainage Features	GC	None apparent.
Toe Drains	GC	Possibly for earth berm to the left of culvert drop inlet.

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp DATE May 24, 1978

PROJECT FEATURE Concrete/Rubble Wall with Earth Berms

AREA EVALUATED	BY	CONDITION
Instrumentation Systems	GC	None known.
Vegetation	GC	Grass on D.S. earth berm.
General Condition of Concrete Surfaces	MH	Top of dam spalled.
Condition of Joints (Describe Location)	MH	Longitudinal joints spalled.
Spalling	MH	Yes.
Visible Reinforcing	MH	No.
Rusting or Staining of Concrete	MH	Yes.
Any Seepage or Efflorescence	MH	Yes at vertical longitudinal joint and horizontal construction joint for three (3) bays right of spillway
Joint Alignment	MH	Good.
Cracking	MH	Top surface.
Rusting or Corrosion of Steel	MH	No.
Erosion or Cavitation	DT	At contact between rubble and concrete.
Alignment of Monoliths	MH	Movement at four (4) foot sections adjacent to spillway.
Numbering of Monoliths	-	
Differential Settlement	MH	Yes at sections adjacent to spillway.
Condition of Structure Foundation	MH	1925 seven (7) foot vertical extensions both dam and spillway.
Structure Additions	MH	Top of dam patched.

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp DATE May 24, 1978

PROJECT FEATURE Spillway - Approach, Channel, Weir, Discharge Channel

AREA EVALUATED	BY	CONDITION
a. Approach Channel	DT	Not visible if any - water over spillway.
General Condition		
Loose Rock Overhanging Channel		
Trees Overhanging Channel		
Floor of Approach Channel		
b. Weir and Training or Sidewalls		
General Condition of Concrete	MH	Spillway joints are spalled interrupting flow.
Rust or Staining	MH	Not visible - water over spillway.
Spalling	MH	Yes at horizontal construction joints.
Any Visible Reinforcing	MH	No.
Any Seepage or Efflorescence	MH	Water over spillway obscuring seepage if occurring.
Drain Holes	GC	None observed.
c. Discharge Channel		
General Condition	GC	Good.
Loose Rock Overhanging Channel	GC	None.
Trees Overhanging Channel	GC	None.
Floor of Channel	GC	Good condition.
Other Obstructions	GC	A few wood pieces, some grass.

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp **DATE** May 24, 1978

PROJECT FEATURE Outlet Works - Transition and Conduit

AREA EVALUATED	BY	CONDITION
General Condition of Concrete	DT	Outlets all buried. Valves controlled at manholes. Owner did not demonstrate the blowoff - condition of piping not visible.
Rust or Staining on Concrete		
Spalling		
Erosion or Cavitation		
Cracking		
Alignment of Monoliths		
Alignment of Joints		
Numbering of Monoliths		
Cast Iron Conduits		

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp **DATE** May 25, 1978

PROJECT FEATURE Reservoir

AREA EVALUATED	BY	CONDITION
Shoreline	DT	Forested and undeveloped Perimeter driven daily to check on trespassing.
Sedimentation	DT	No problem.
Potential Upstream Hazard Areas	DT	None known.
Watershed Alteration - Runoff Potential	DT	None at this time.

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp DATE May 25, 1978

PROJECT FEATURE Operation and Maintenance

AREA EVALUATED	BY	CONDITION
a. Reservoir Regulation Plan		
Normal Conditions	DT	Dam is visited daily for water level readings.
Emergency Plans	DT	Report emergencies directly to supervisor.
Warning System	DT	
b. Maintenance (Type) (Regularity)		
Dam	DT	Maintenance when needed is reported to supervisor. Valves greased and checked at least once a year.
Spillway	DT	
Outlet Works	DT	

PERIODIC INSPECTION CHECK LIST

PROJECT Peat Swamp **DATE** May 25, 1978

PROJECT FEATURE Safety and Performance Instrumentation

AREA EVALUATED	BY	CONDITION
Headwater and Tailwater Gages	DT	Yes - water level gauge only.
Horizontal and Vertical Alignment Instrumentation (Concrete Structures)	DT	None.
Horizontal and Vertical Movement, Consolidation, and Pore-Water Pressure Instrumentation (Embankment Structures)	DT	None.
Uplift Instrumentation	DT	None.
Drainage System Instrumentation	DT	None.
Seismic Instrumentation	DT	None.

APPENDIX
SECTION B: EXISTING DATA

SPECIAL NOTE

SECTION B

AVAILABILITY OF DATA

The plans listed in the Table of Contents, Appendix Section B, are included in the master copy of this report, which is on file at the office of the Army Corps of Engineers, New England Division, in Waltham, Massachusetts.

No. SY 6

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

Long 73-3.5
Lat 41-22.2

Inventoried By WPS

Date 12 MAY 1964

Name of Dam or Pond PEAT SWAMP RESERVOIR (Beaver Lake) 1889

Code No. H 11.8 N1.6 BV 2.8

Nearest Street Location MAPLE STREET

Town SEYMOUR

U.S.G.S. Quad. ANSONIA

Name of Stream BEAVER BROOK

Owner THE ANSONIA/Derby WATER COMPANY

Address 354 MAIN STREET

ANSONIA 735-1888

1889

Pond Used For WATER SUPPLY

Dimensions of Pond: Width 600 FEET Length 3000 FEET Area ~~45 acre~~ 73.60

Total Length of Dam 500 FEET Length of Spillway 25 FEET

Location of Spillway SOUTH-EAST END OF DAM

Height of Pond Above Stream Bed 40 FEET

Height of Embankment Above Spillway 5 FEET

Type of Spillway Construction CONCRETE

Type of Dike Construction CONCRETE & EARTH

Downstream Conditions RIMMON ROAD, CITY OF ANSONIA

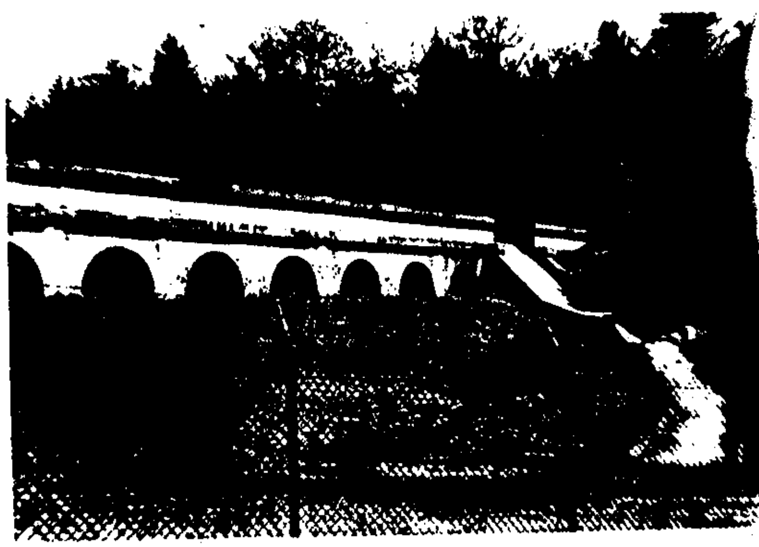
Summary of File Data

Remarks

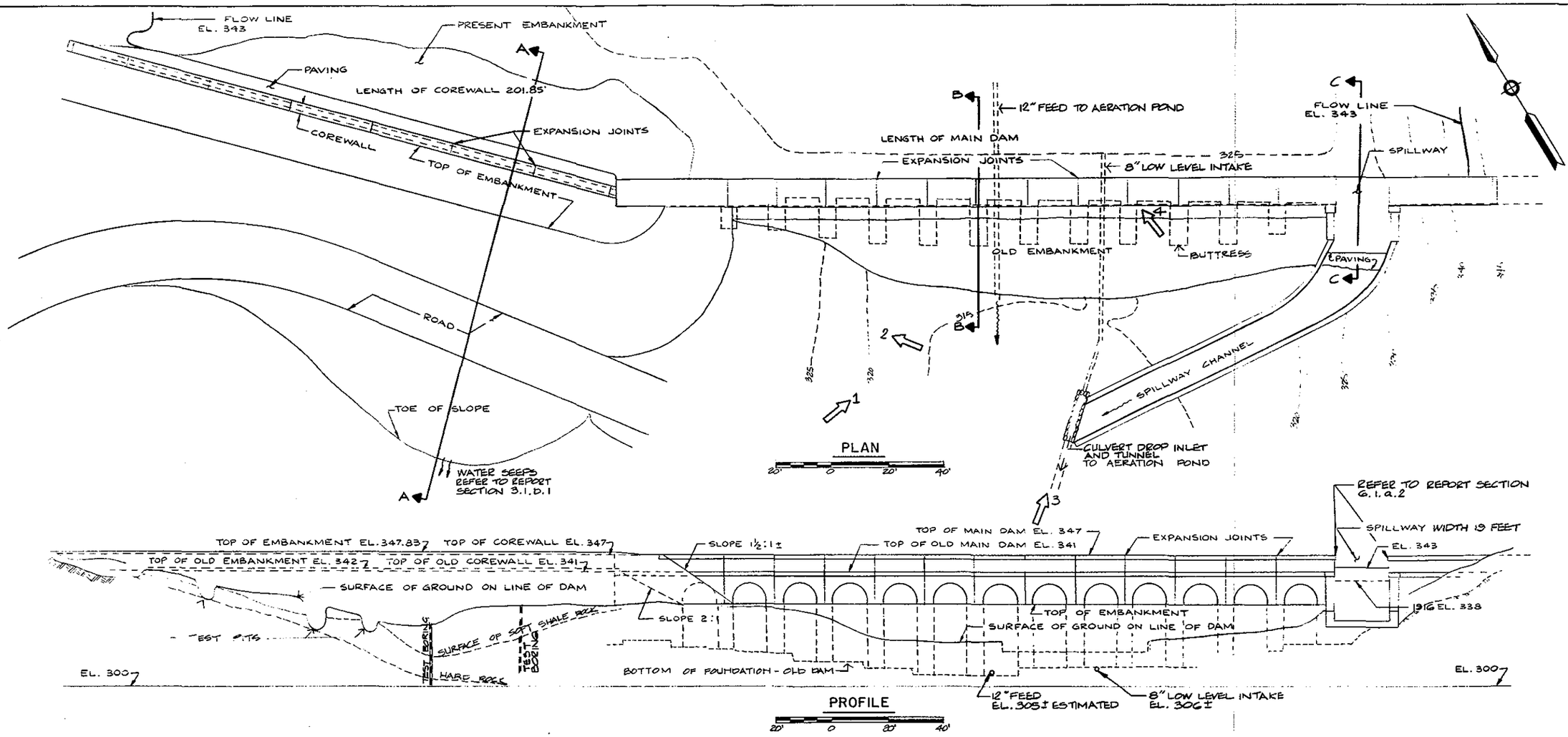
Would Failure Cause Damage? YES Class B

B-1

MAY 64

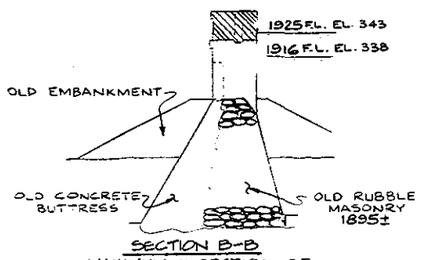


B-2

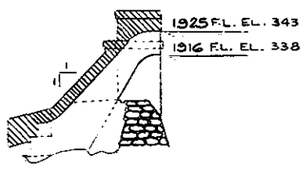


NOTE: ALL INFORMATION SHOWN HEREON HAS BEEN COMPILED FROM EXISTING RECORDS & VISUAL OBSERVATIONS.

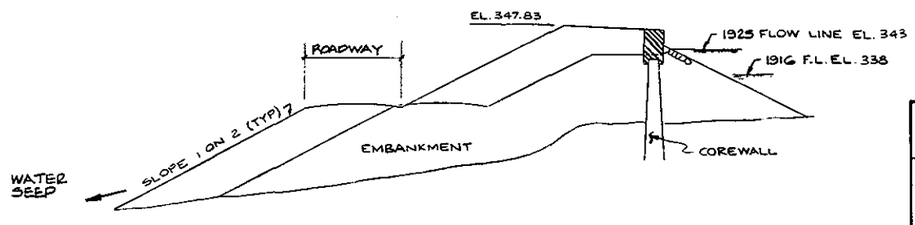
⇨1 PHOTO NUMBER AND DIRECTION



SECTION B-B
MAXIMUM X-SECTION OF MAIN DAM



SECTION C-C
SECTIONAL ELEVATION OF SPILLWAY



SECTIONS
16' 0 16' 32'

SECTION A-A
MAXIMUM X-SECTION OF COREWALL DAM

CAHN ENGINEERS INC. WALLINGFORD, CONNECTICUT CONSULTANT-ENGINEER	US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

PEAT SWAMP RESERVOIR DAM

BEAVER BROOK — SEYMOUR, CONNECTICUT

DES. BY	CHK'D	APP. BY	[illegible]
DRAWN	DAT	DMH	5/24/78

PAGE 8-8

APPENDIX

SECTION C: DETAIL PHOTOGRAPHS

PHOTO NO.3 - View of spillway. Length of weir is 19 feet.

PHOTO NO.4 - Cavity next to concrete wall adjacent to fourth buttress from spillway.

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PEAT SWAMP RESERVOIR DAM BEAVER BROOK SEYMOUR, CONNECTICUT CE# 27 531 GB DATE 5/24/78 PAGE C-2
CAHN ENGINEERS INC. WALLINGFORD, CONN. ARCHITECT—— ENGINEER		

PHOTO NO.1 - General view of dam, spillway and left abutment.

PHOTO NO.2 - General view of slope of downstream berm of dam section consisting of concrete/rubble wall with earth berms.

US ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	PEAT SWAMP RESERVOIR DAM BEAVER BROOK SEYMOUR, CONN. CE # 27 531 GB DATE 5/24/78 PAGE C-1
CAHN ENGINEERS INC. WALLINGFORD, CONN. ARCHITECT—— ENGINEER		

APPENDIX

SECTION D: HYDRAULIC/HYDROLOGIC COMPUTATIONS

PRELIMINARY GUIDANCE

FOR ESTIMATING

MAXIMUM PROBABLE DISCHARGES

IN

PHASE I DAM SAFETY

INVESTIGATIONS

New England Division
Corps of Engineers

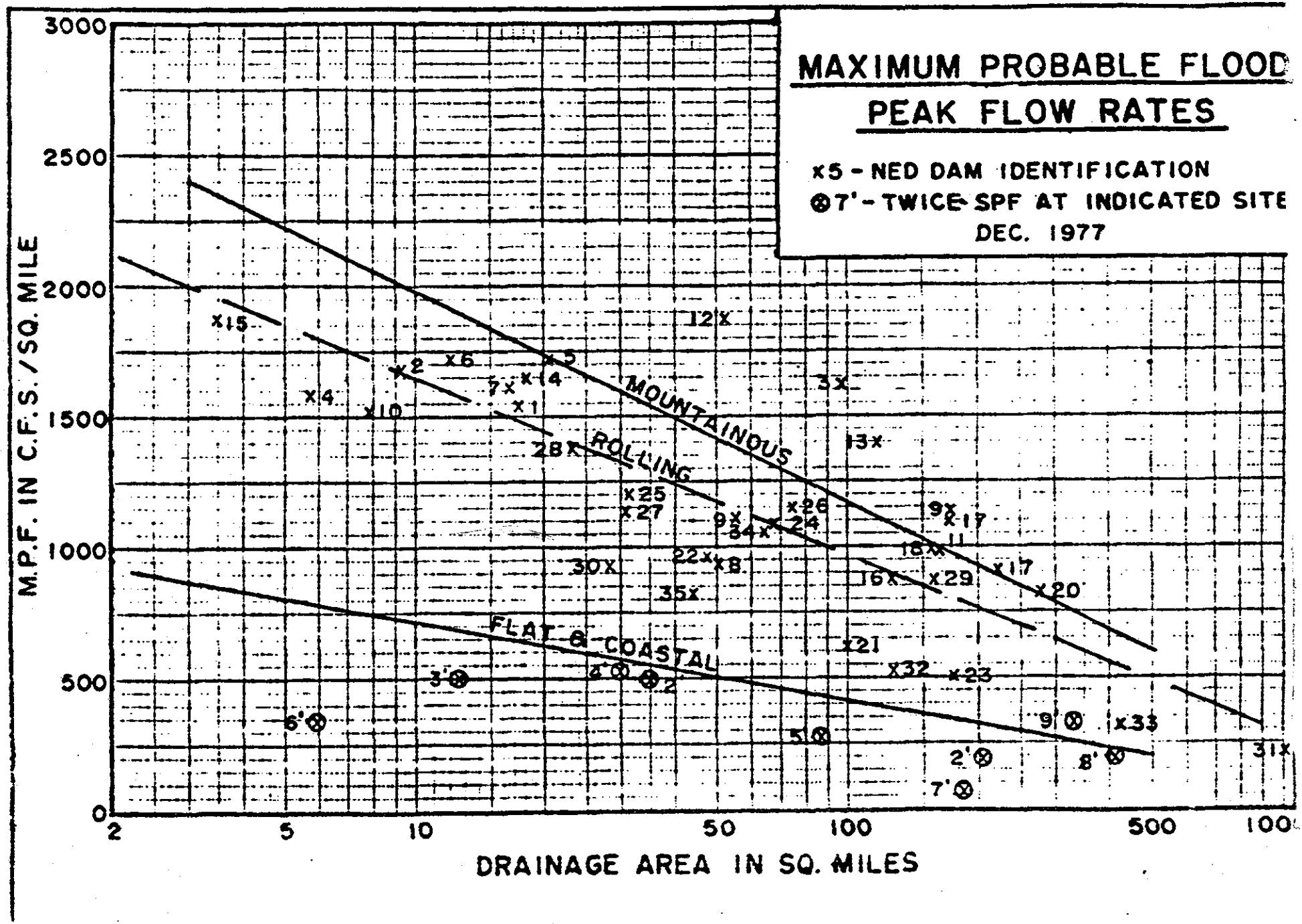
March 1978

MAXIMUM PROBABLE FLOOD INFLOWS
NED RESERVOIRS

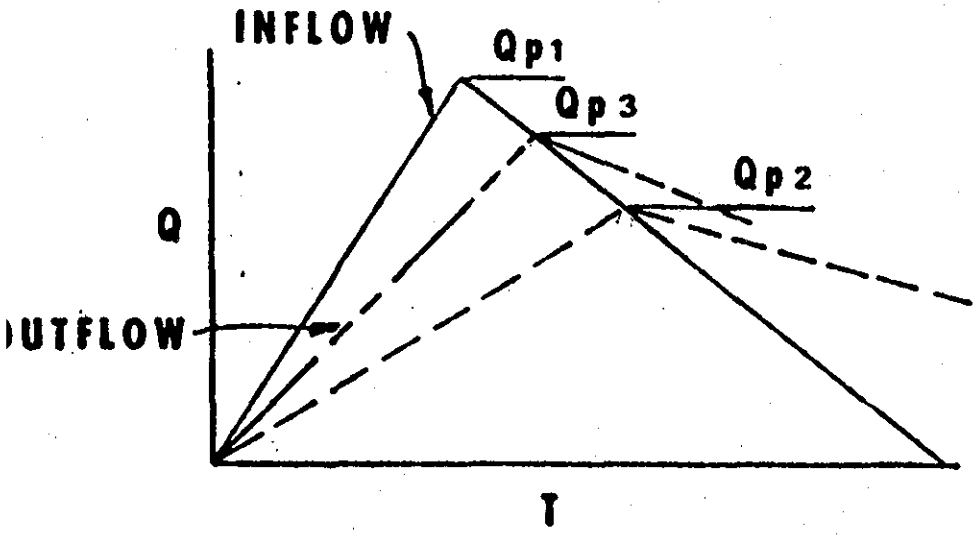
	Project	Q (cfs)	D.A. (sq. mi.)	MPF cfs/sq. mi.
1.	Hall Meadow Brook	26,600	17.2	1,546
2.	East Branch	15,500	9.25	1,675
3.	Thomaston	158,000	97.2	1,625
4.	Northfield Brook	9,000	5.7	1,580
5.	Black Rock	35,000	20.4	1,715
6.	Hancock Brook	20,700	12.0	1,725
7.	Hop Brook	26,400	16.4	1,610
8.	Tully	47,000	50.0	940
9.	Barre Falls	61,000	55.0	1,109
10.	Conant Brook	11,900	7.8	1,525
11.	Knightville	160,000	162.0	987
12.	Littleville	98,000	52.3	1,870
13.	Colebrook River	165,000	118.0	1,400
14.	Mad River	30,000	18.2	1,650
15.	Sucker Brook	6,500	3.43	1,895
16.	Union Village	110,000	126.0	873
17.	North Hartland	199,000	220.0	904
18.	North Springfield	157,000	158.0	994
19.	Ball Mountain	190,000	172.0	1,105
20.	Townshend	228,000	106.0(278 total)	820
21.	Surry Mountain	63,000	100.0	630
22.	Otter Brook	45,000	47.0	957
23.	Birch Hill	88,500	175.0	505
24.	East Brimfield	73,900	67.5	1,095
25.	Westville	38,400	99.5(32 net)	1,200
26.	West Thompson	85,000	173.5(74 net)	1,150
27.	Hodges Village	35,600	31.1	1,145
28.	Buffumville	36,500	26.5	1,377
29.	Mansfield Hollow	125,000	159.0	786
30.	West Hill	26,000	28.0	928
31.	Franklin Falls	210,000	1000.0	210
32.	Blackwater	66,500	128.0	520
33.	Hopkinton	135,000	426.0	316
34.	Everett	68,000	64.0	1,062
35.	MacDowell	36,300	44.0	825

MAXIMUM PROBABLE FLOWS BASED ON TWICE THE STANDARD PROJECT FLOOD (Flat and Coastal Areas)

	River	SPF (cfs)	D.A. (sq. mi.)	MPF (cfs/sq. mi.)
1.	Pawtuxet River	19,000	200	190
2.	Mill River (R.I.)	8,500	34	500
3.	Peters River (R.I.)	3,200	13	490
4.	Kettle Brook	8,000	30	530
5.	Sudbury River.	11,700	86	270
6.	Indian Brook (Hopk.)	1,000	5.9	340
7.	Charles River.	6,000	184	65
8.	Blackstone River.	43,000	416	200
9.	Quinebaug River	55,000	331	330


MAXIMUM PROBABLE FLOOD
PEAK FLOW RATES
x5 - NED DAM IDENTIFICATION
⊗7' - TWICE SPF AT INDICATED SITE
DEC. 1977
M.P.F. IN C.F.S./SQ. MILE
DRAINAGE AREA IN SQ. MILES
3000
2500
2000
1500
1000
500
0
2
5
10
50
100
500
MOUNTAINOUS
ROLLING
FLAT & COASTAL
x15
x4
x10
x2
x6
x14
x1
12x
3x
13x
28x
x25
x27
x26
x24
34x
9x
x17
11
18x
x17
x20
16x
x29
30x
22x
x8
35x
x21
x32
x23
3'⊗
4'⊗
2
6'⊗
5⊗
9'⊗
x33
2'⊗
8'⊗
7'⊗
31x

ESTIMATING EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES



STEP 1: Determine Peak Inflow (Qp_1) from Guide Curves.

STEP 2: a. Determine Surcharge Height To Pass "Qp_1".

b. Determine Volume of Surcharge ($STOR_1$) In Inches of Runoff.

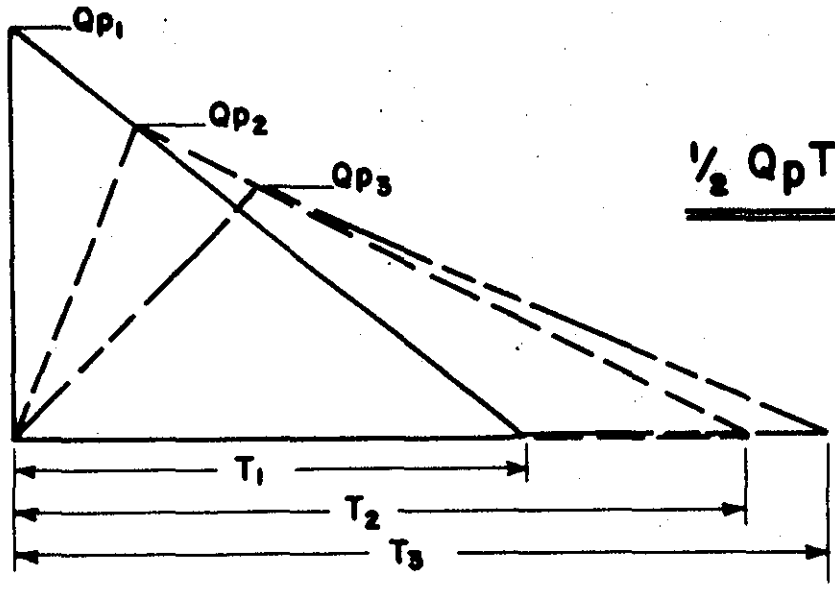
c. Maximum Probable Flood Runoff In New England equals Approx. 19", Therefor

$$Qp_2 = Qp_1 \times \left(1 - \frac{STOR_1}{19}\right)$$

STEP 3: a. Determine Surcharge Height and "$STOR_2$" To Pass "Qp_2"

b. Average "$STOR_1$" and "$STOR_2$" and Determine Average Surcharge and Resulting Peak Outflow "Qp_3".

"RULE OF THUMB" GUIDANCE FOR ESTIMATING DOWNSTREAM DAM FAILURE HYDROGRAPHS



$\frac{1}{2} Q_p T = 12 S$

STEP 1: DETERMINE OR ESTIMATE RESERVOIR STORAGE (S) IN AC-FT AT TIME OF FAILURE.

STEP 2: DETERMINE PEAK FAILURE OUTFLOW (Q_{p1}).

$$Qp_1 = \frac{8}{27} W_b \sqrt{g} Y_o^{\frac{3}{2}}$$

W_b = BREACH WIDTH - SUGGEST VALUE NOT GREATER THAN 40% OF DAM LENGTH ACROSS RIVER AT MID HEIGHT.

Y_o = TOTAL HEIGHT FROM RIVER BED TO POOL LEVEL AT FAILURE.

STEP 3: USING USGS TOPO OR OTHER DATA, DEVELOP REPRESENTATIVE STAGE-DISCHARGE RATING FOR SELECTED DOWNSTREAM RIVER REACH.

STEP 4: ESTIMATE REACH OUTFLOW (Q_{p2}) USING FOLLOWING ITERATION.

A. APPLY Q_{p1} TO STAGE RATING, DETERMINE STAGE AND ACCOPMANYING VOLUME (V_1) IN REACH IN AC-FT. (NOTE: IF V_1 EXCEEDS 1/2 OF S, SELECT SHORTER REACH.)

B. DETERMINE TRIAL Q_{p2}.

$$Qp_2(\text{TRIAL}) = Qp_1 \left(1 - \frac{V_1}{S}\right)$$

C. COMPUTE V_2 USING Q_{p2} (TRIAL).

D. AVERAGE V_1 AND V_2 AND COMPUTE Q_{p2}.

$$Qp_2 = Qp_1 \left(1 - \frac{V_{ave}}{S}\right)$$

STEP 5: FOR SUCCEEDING REACHES REPEAT STEPS 3 AND 4.

APRIL 1978

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA, CT

(1) MAXIMUM PROBABLE FLOOD - PEAK FLOOD RATE

(a) WATERSHED CLASSIFIED AS "MOUNTAINOUS" TYPE. THE MPF GUIDE CURVES FURNISHED BY THE ACE, NEW ENGLAND DIV. OFFICE ARE USED FOR THE DETERMINATION OF MPF.

(b) WATERSHED AREA. DA = 0.52 SQ. MI (AS MEASURED BY C.E.)

(c) FROM GUIDE CURVE (EXTRAPOLATION)

M.P.F ≈ 3,100 CFS/SQ. MI

(d) M.P.F = PEAK INFLOW

Q = 3,100 × 0.52 = 1,600 CFS

(2) SPILLWAY DESIGN FLOOD (SDF)

(a) CLASSIFICATION OF DAM ACCORDING TO ACE RECOMMENDED GUIDELINES.

(1) SIZE: (IMPOUNDMENT) - (SEE D.SHEN COMPS, 5/30/1978. P1)

STORAGE (MAX) = 1,990 Ac-Ft (INTERIM)

HEIGHT = 31 FT (BY C.E FROM ANSONIA WATER CO. MAPS OF 1925)

HENCE, THE DAM IS CLASSIFIED AS OF "INTERMEDIATE" SIZE

HYDROLOGIC/HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA CT

(2) (CONT'D) - SPILLWAY DESIGN FLOOD (SDF)

(iii) HAZARD POTENTIAL:

THE DAM IS LOCATED UPSTREAM OF RT. 318, MIDDLE & QUILLINAN RESERVOIRS, AND ANSONIA URBAN AREA. THEREFORE, ITS HAZARD POTENTIAL IS RATED "HIGH"

(vii) SDF

ACCORDING TO ACE RECOMMENDED GUIDELINES FOR A DAM OF INTERMEDIATE SIZE WITH A HIGH HAZARD POTENTIAL THE SPILLWAY DESIGN FLOOD SHALL BE THE MAXIMUM PROBABLE FLOOD

$$SDF = MPF = 1,600 \text{ CFS}$$

(3) EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES.

(a) PEAK INFLOW (SDF=MPF)

$$Q_{p_1} = 1,600 \text{ CFS}$$

(b) SURCHARGE HEIGHT TO PASS Q_{p_1}

SPILLWAY DATA:

FROM ANSONIA WATER CO. GENERAL PLAN & PROFILE, DATED MARCH 1925:

LENGTH OF SPILLWAY CREST = 19'

VERTICAL U/S FACE; ROUNDED (OGEE TYPE) SPILLWAY; D/S FACE SLOPE 1:1. U/S HEIGHT OF SPILLWAY CREST TO GROUND, $P > 15'$.

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA, CT

(3) (Cont'd) - EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES.

(b) SURCHARGE HEIGHT TO PASS Q_{P_1}

THEREFORE, FOR THE EXPECTED HIGH HEAD OVER THE SPILLWAY.

ASSUME $C = 3.95$

$$CL = 3.95(19) \cong 75$$

$$\therefore Q \cong 75 H^{3/2}$$

$$H = \left(\frac{Q}{75}\right)^{2/3}$$

$$\therefore \text{@ } Q_{P_1} = 1{,}600 \text{ CFS}$$

$$H_1 \cong 7.7'$$

MAXIMUM FREEBOARD FROM SPILLWAY CREST TO TOP OF DAM IS 4' THEREFORE, THE DAM IS OVERTOPPED

SPILLWAY CAPACITY, $H = 4'$ $Q \cong 600$ CFS

(c) FIND SURCHARGE HEIGHT H_1

DEPTH OF WATER ABOVE TOP OF THE DAM: $H_1 - 4$

LENGTH OF MAIN DAM: ±309.5' (ANSONIA WATER COMPANY PLANS FOR RAISING PEAT SWAMP DAM, MARCH, 1925)

WITH VERTICAL U/S AND D/S FACES

TOP WIDTH 9'

ASSUME $C \cong 2.64$ $CL \cong 817'$

$$Q \cong 817(H_1 - 4)^{3/2}$$

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA, CT

(3) (Cont'd) - EFFECT OF SURCHARGE STORAGE ON MAXIMUM PROBABLE DISCHARGES

(c) FIND SURCHARGE HEIGHT H_1,

LENGTH OF EMBANKMENT SECTION WITH CORE WALL ± 202.' (ANSONIA WATER CO. PLANS MARCH, 1925)

WIDTH OF EMBANKMENT AND PAVING ± 20'

WITH A D/S SLOPE OF V:H = 1:2 AND A U/S SLOPE OF V:H = 1:2, 3' BELOW THE TOP OF THE EMBANKMENT

ASSUME $C \approx 2.60$ $CL \approx 525$

$$Q \approx 525 (H_1 - 4)^{3/2}$$

OVERBANK SPILLAGE

A BERM ON THE EASTERLY END RISES 3' IN A DISTANCE OF 40'

ASSUME EQUIVALENT LENGTH OF EASTERLY OVERBANK SPILLAGE

$$= \frac{2}{3}\left(\frac{40}{3}\right)(H_1 - 4)$$

ASSUME $C \approx 2.60$ $CL \approx (2.6)\left(\frac{2}{3}\right)\left(\frac{40}{3}\right)(H_1 - 4)$

$$Q \approx 23 (H_1 - 4)^{5/2}$$

A BERM ON THE WESTERLY END RISES 3' IN A DISTANCE OF 50'

ASSUME EQUIVALENT LENGTH OF WESTERLY OVERBANK SPILLAGE

$$= \frac{2}{3}\left(\frac{50}{3}\right)(H_1 - 4)$$

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA CT

(3) (CONT'D) EFFECT OF SURCHARGE STORAGE ON MPD'S

(C) FIND SURCHARGE HEIGHT H_1

ASSUME

$$C = 2.6$$

$$CL \equiv (2.6)\left(\frac{2}{3}\right)\left(\frac{50}{3}\right)(H_1 - 4)$$

$$Q \equiv 29 (H_1 - 4)^{5/2}$$

HENCE, THE SPILLWAY / DAM RATING EQUATION IS APPROXIMATE AS:

$$Q \equiv 75 H_1^{3/2} + 1342 (H_1 - 4)^{3/2} + 52 (H_1 - 4)^{5/2}$$

FOR $H_1 > 4'$

H_1 IS THE SURCHARGE ABOVE THE SPILLWAY CREST.

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR . ANSONIA . CT

(3) (cont'd). EFFECT OF SURCHARGE STORAGE ON MPD's

(c) FIND TRUE SURCHARGE HEIGHT H_1

$\therefore$ For $Q_{P_1} = 1,600$ CFS

$H_1 \approx 4.72'$

HENCE, THE SURCHARGE HEIGHT ABOVE THE SPILLWAY CREST IS $\pm 4.72'$ AND $\pm 0.72'$ ABOVE THE TOP OF THE DAM.

(d) VOLUME OF SURCHARGE

MAX. W.L. IN RECORD $\equiv$ 7"

ASSUME NORMAL POOL ELEVATION 0.25 FT. ABOVE THE SPILLWAY CREST.

AREA OF POOL AT FLOW LINE = 82.1 Ac. (ANSONIA WATER CO. CONTOUR MAP OF PEAT SWAMP LAKE 1925)

FOR $Q_{P_1} = 1,600$ CFS AND $H_1 \approx 4.72'$

VOL. OF SURCHARGE.

$82.1 \cdot (4.72 - 0.25) \equiv 367$ Ac-ft

D.A. = 0.32 sq. mi.

$$S_1 = \frac{367}{0.52 \times 53.3} = 13.2"$$

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR, ANSONIA, CT.

(3) (CONT'D) EFFECT OF SURCHARGE VOL. ON MPD'S

(e) PEAK OUTFLOW FOR SURCHARGE S_1
(SEE GUIDELINE FOR ASSUMING A TRIANGULAR HYDROGRAPH AND MPF RUNOFF OF 19")

$$Q_{p2} = Q_{p1}\left(1 - \frac{S_1}{19}\right)$$

$$Q_{p2} \approx 1{,}600\left(1 - \frac{13.2}{19}\right)$$

$$\therefore Q_{p2} \approx 490 \text{ CFS} < \text{SPILLWAY CAPACITY TO TOP OF DAM.}$$

FOR $Q_{p2} \approx 490$ CFS

$H_2 \approx 3.5'$

AND $S_2 \approx 7.6"$ SAVE $= 11.4"$

(f) RESULTING PEAK OUTFLOW

$$Q_{p3} = 1{,}600\left(1 - \frac{11.4}{19}\right)$$

$$\therefore Q_{p3} \approx 640 \text{ CFS}$$

$H_3 \approx 4.1'$

(g) SUMMARY:

PEAK INFLOW $Q_{p1} = MPF = 1{,}600$ CFS

PEAK OUTFLOW $Q_{p3} \approx 640$ CFS

AVERAGE SURCHARGE ABOVE THE SPILLWAY CREST IS 4.1 FT (JUST OVER TOP OF DAM)

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA . CT.

DOWNSTREAM DAM FAILURE HAZARD

(1) ESTIMATE OF DOWNSTREAM DAM FAILURE HYDROGRAPH
(SEE ACE "RULE OF THUMB" GUIDELINE FOR ESTIMATING THE HYDROGRAPHS")

ESTIMATE OF RESERVOIR STORAGE(S) AT TIME OF FAILURE:
(SEE D. SHEN'S COMPS. 5/23/1978)

(i) MAXIMUM STORAGE CAPACITY (REF. ANSONIA WATER CO., DWGS, 1925.
CAPACITY AT FLOWLINE (ELEV. 343) = 540 MG ≡ 1660 Ac-ft
ADDITIONAL CAPACITY TO TOP OF DAM (ELEV. 347)
= *82.1 × 4 = 330 Ac-ft
∴ MAX. STORAGE CAPA ≅ 1990 Ac-ft

* AREA OF POND AT FLOWLINE = 82.1 Ac
(U.S. INVENTORY OF DAMS SHOWS STOR. OF 1900 Ac-ft)

(ii) HEIGHT OF DAM ABOVE LOWEST GROUND D/S ELEV. (±EL316)
H ≅ 347 − 316 = ± 31 ft

(iii) ESTIMATED VOLUME OF STORAGE AT TIME OF FAILURE
(TO SURCHARGE OF ± 4.1 ft ABOVE THE SPILLWAY CREST, OR ELEV. 347.1, JUST ABOVE TOP OF DAM ELEV. 347)

USE CAPACITY AT FLOWLINE = 1660 Ac-ft

AREA OF POND AT FLOWLINE = 82.1 Ac

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA, CT

DOWNSTREAM DAM FAILURE HAZARD

(I) (CONT'd) ESTIMATE OF DOWNSTREAM DAM FAILURE HYDROGRAPH

(a) ESTIMATE OF RESERVOIR STORAGE AT TIME OF FAILURE

(iv) ESTIMATE VOL. OF STORAGE AT TIME OF FAILURE

$S \approx 1660 + \frac{1}{2}(2.1)(41) \approx$ 2,000 Ac-Ft

$S/2 = 1{,}000$ Ac-Ft

(b) PEAK FAILURE OUTFLOW (Q_p)

(i) BREACH WIDTH

ESTIMATE OF BREACH WIDTH FROM ANSONIA WATER CO. GENERAL PLAN AND PROFILE OF MARCH, 1925.

APPROX. LENGTH OF DAM AT MID-HEIGHT $\approx \pm 390$ FT

$W \approx 0.4 \times 390 = 156'$

TAKE $W_b \approx$ 150'

(ii) TOTAL HEIGHT AT FAILURE

$Y_o \approx 347.1 - 316 \approx$ 31.1 FT

APPROX. DEPTH OF WATER AT IMMEDIATE IMPACT REGION (IMMEDIATELY D/S OF DAM SITE)

$Y \approx 0.44\, Y_o \approx 13.7'$

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA . CT

DOWNSTREAM DAM FAILURE HAZARD

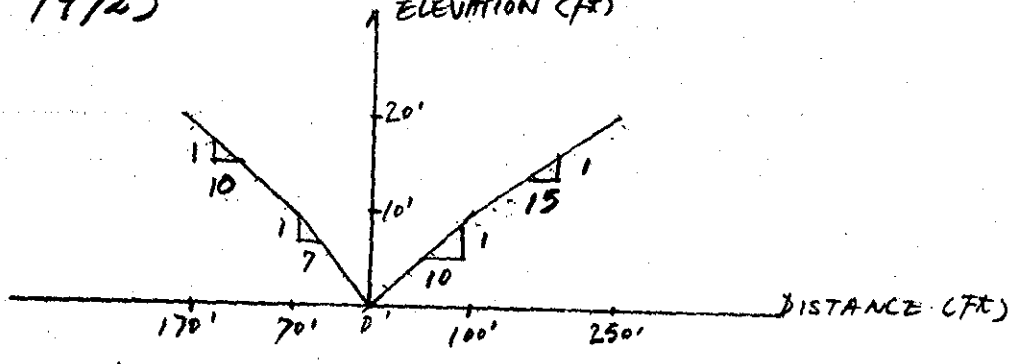
(1) (CONT'D) ESTIMATE OF DOWNSTREAM DAM FAILURE HYDROGRAPH

(b) PEAK FAILURE OUTFLOW (Qp1)

(iii) PEAK FAILURE OUTFLOW

$$Q_{p1} = \frac{8}{27}\sqrt{g}\, W_b\, y_o^{1.5} \cong \underline{43,500 \text{ CFS}}$$

(c) TYPICAL D/S CROSS-SECTION & RATING CURVES (FROM TOPOGRAPHIC MAP OF ANSONIA, CONN. 1964 PHOTOREVISED 1972)



ASSUME (1) $n \cong 0.050$ MANNING'S ROUGHNESS COEFF.

(2) $S \cong 0.029 \frac{\#}{\#}$ (VERTICAL DROP OF 200', IN # DISTANCE OF 7000')

$\sqrt{S} \cong 0.169$ AVERAGED SLOPE

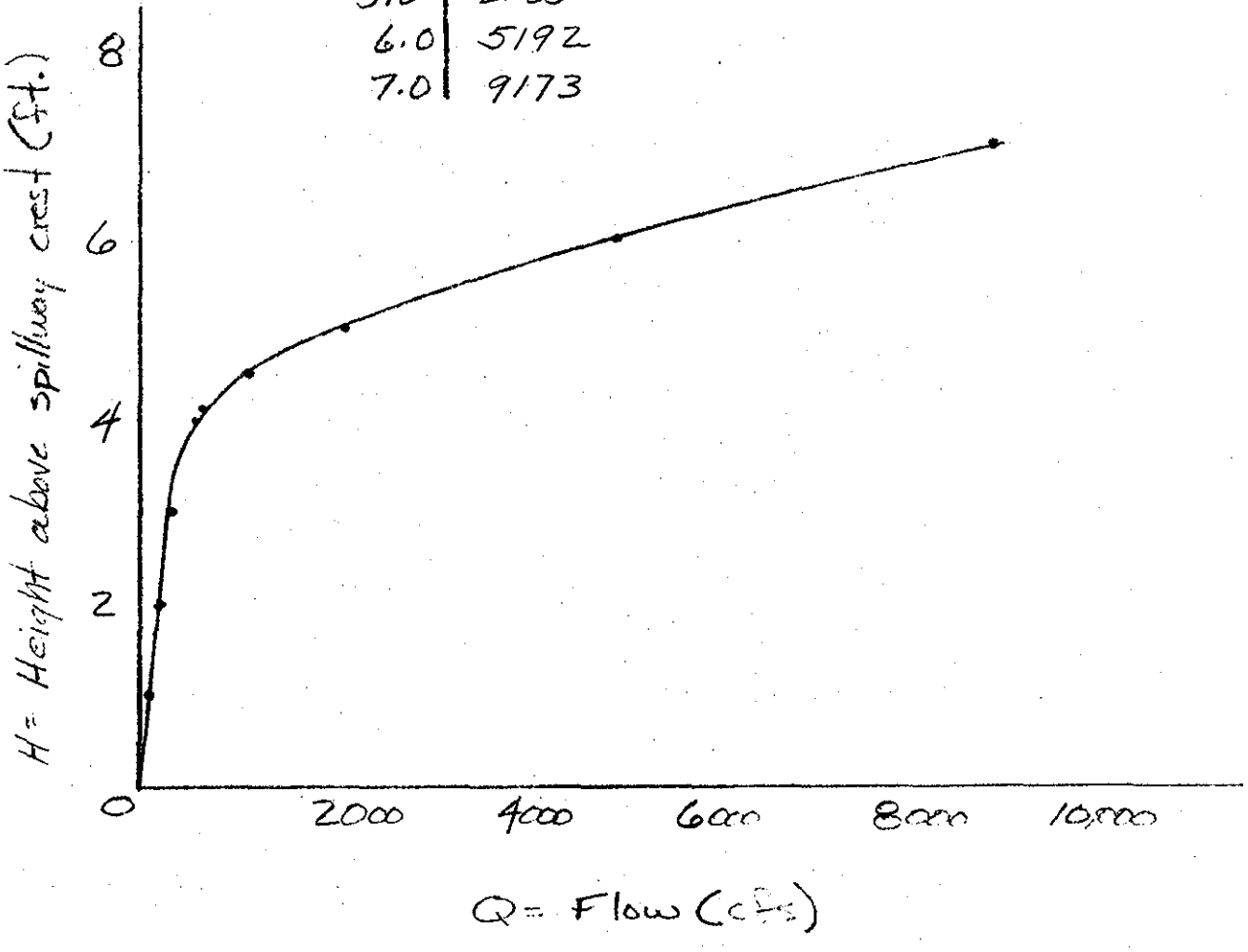
Cahn Engineers Inc. Consulting Engineers

Project [illegible] Dam | Sheet 1 of 1
Computed By [illegible] | Checked By | Date 11/6/15
Field Book Ref. | Other Refs. | Revisions

SPILLWAY RATING CURVE

$$Q = 75H^{3/2} + 154.2(H-4)^{3/2} + 52(H-4)^{5/2}$$

H(ft.)	Q(cfs)
1.0	75
2.0	212
3.0	390
4.0	600
4.1	665
4.5	1200
5.0	2233
6.0	5192
7.0	9173



D-16A

Project INSPECTION OF NON-FEDERAL DAMS IN NEW ENGLAND Sheet 4 of 7
Computed By D. SHEN Checked By [illegible] Date 5/31/1978
Field Book Ref. Other Refs. CE #27-531-GB Revisions

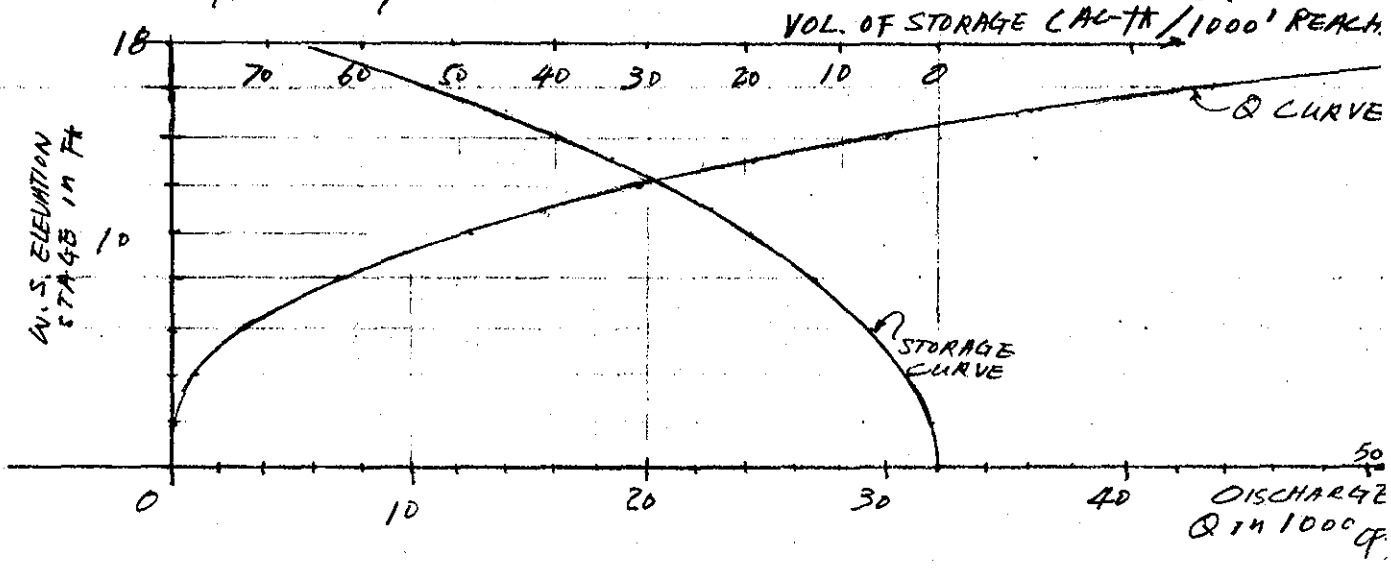
HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA, CT.

DOWNSTREAM DAM FAILURE HAZARD

(b) (Cont'd) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH.

(c). TYPICAL D/S CROSS-SECTION AND RATING CURVE.



(d) REACH OUTFLOW (Q_{P2})

(i) @ Q_{P_1} = 43,500 CFS STAGE ≈ 16.0' FROM RATING CURVE

VOLUME IN REACH : $V_1 \approx 53 \times 7 \approx 370$ AC-FT $< \frac{S}{2}$ O.K

($\frac{S}{2}$ = 1000 AC-FT)

NOTE: REACH DISTANCE ± 7000 FT FROM PEAT SWAMP RESV. D/S POINT TO U/S END OF QUILLINAN RESV.

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR ANSONIA CT

DOWNSTREAM DAM FAILURE HAZARD

1. (Cont'd) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH

(d) REACH OUTFLOW (Q_{p2})

(ii) $Q_{p2} = Q_{p1}\left(1-\frac{V_1}{S}\right) = 43,500\left(1-\frac{370}{2000}\right) \approx 35,500$ CFS

(iii) @ $Q_{p2} \approx 35,500$ CFS, STAGE $\approx$ 14.8'

$V_2 \approx 1 \times 46 \approx 320$ Ac-ft

(iv) AVE. VOLUME IN REACH $= \left(\frac{V_1+V_2}{2}\right) = 345$ Ac-ft

$\therefore Q_{p2} \approx 43,500\left(1-\frac{345}{2000}\right) = \underline{36,000 \text{ CFS}}$

STAGE $\approx$ 15 Ft

Q_{p2}, & STAGE ARE UPSTREAM OF QUILLINAN RESERVOIR.

(e) ESTIMATE EFFECT OF QUILLINAN RESERVOIR ON Q_{p2}

(i) Q_{p2} = INFLOW FLOOD TO RESERVOIR

$Q_{p2} = 36,000$ CFS

(ii) SURCHARGE ABOVE TOP OF DAM (SPILLWAY CAPACITY IS NEGLIGIBLE - FIELD OBSERVATION - THEREFORE, ASSUME DAM OVERTOPPED)

Assume $C = 3.0$

LENGTH OF DAM AND SIDE SPILLS, $L \approx 500$ FT (FROM USGS ANSONIA QUAD. SHEET)

$CL \approx 1500$

$Q = 1500\, H^{3/2}$

$H = \left(\frac{Q}{1500}\right)^{2/3}$

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR, ANSINIA CT

DOWNSTREAM DAM FAILURE HAZARD

1. (cont'd) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH

(e) ESTIMATE EFFECT OF QUILLINAN RESERVOIR ON Q_{p_2}.

(iii) SURCHARGE ABOVE TOP OF DAM

$\therefore$ @ $Q_{p_2} \approx 36,000$ CFS

$H_2 \approx 8.3'$

ELEV. OF TOP OF DAM $= \pm 135'$ (FROM USGS QUAD SHEET)

$\therefore$ ELEV. OF SURCHARGE $= \pm 143.3'$

(iii) SURFACE AREA OF QUILLINAN RESERVOIR

≈ 11 AC (FROM USGS QUAD SHEET)

VOLUME OF SURCHARGE ABOVE TOP OF DAM

$V_R \approx 11 \times 8.3 \approx 91$ AC-FT

$V_R \approx 91$ AC-FT $< S/2$ O.K

(iv) PEAK FLOOD OUTFLOW : TRIAL Q_{p_3}

$$Q_{p_3} = Q_{p_2}\left(1 - \frac{V_R}{S}\right) = 36,000\left(1 - \frac{91}{2000}\right)$$

$Q_{p_3} \approx 34,400$ CFS,

$H_3 \approx 8.1'$

$V_R \approx 89$ AC-FT

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR, ANSONIA CT.

DOWNSTREAM DAM FAILURE HAZARD

(l) (cont'd) ESTIMATE OF D/S DAM FAILURE HYDROGRAPH

(e) ESTIMATE EFFECT OF QUILLINAN RESERVOIR ON Q_{p2}

(v) PEAK FLOOD OUTFLOW Q_{p3}

$V_{RAVE} = 90$ Ac-Ft

$$Q_{p3} = Q_{p2}\left(1 - \frac{V_{RAVE}}{S}\right) = 36000\left(1 - \frac{90}{2000}\right)$$

$$\cong 34{,}400 \text{ CFS}$$

$H_3 \cong 8.1'$ ABOVE QUILLINAN RESR. DAM.

THIS DAM PROBABLY WILL ALSO BREACH UNDER THIS SURCHARGE

(f) Summary:

PEAK FAILURE OUTFLOW $Q_{p1} \cong 43{,}500$ CFS
UPSTREAM OF QUILLINAN RESV.
PEAK REACH OUTFLOW $Q_{p2} \cong 36{,}000$ CFS
AVG. STAGE $H_2 \cong 15$ FT
PEAK OUTFLOW AT QUILLINAN RESV. DAM
$Q_{p3} \cong 34{,}400$ CFS
$H_3 \cong 8.1'$ (APPROX. DEPTH OVER DAM. i.e., RESERVOIR WL ± 143')

NOTE: BECAUSE MIDDLE RESERVOIR (JUST D/S FROM PEAT SWAMP) IS RELATIVELY SMALL, THE EFFECT OF STORAGE (AND BREACHING) OF THIS RESERVOIR HAS BEEN NEGLECTED.

HYDROLOGIC / HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR, ANSONIA, CT.

1A) MPF ESTIMATE FROM HIGH INTENSITY RAINFALL PERIOD OF A SHORT DURATION STORM IN A SMALL WATERSHED

THIS PARALLEL COMPUTATION IS MADE CONSIDERING THAT FOR SMALL DRAINAGE AREAS USE BY EXTRAPOLATION OF THE MPF GUIDE CURVES FURNISHED BY THE ACE NEW ENGLAND DIVISION, MAY GIVE PEAK RUN-OFFS OF LESSER MAGNITUDE THAN THOSE WHICH COULD OCCUR.

ASSUME FOR PEAT SWAMP A TIME OF CONCENTRATION OF ABOUT 30 MINUTES, IN THE HIGH INTENSITY RAINFALL PERIOD OF A 6-HR RAINFALL, FOR ESTIMATING THE MAX. PROBABLE RUN OFF.

a) 6-HR PMP AT PEAT SWAMP : PMP = 24.5" (10 SQ MI. EPT. RAINFALL,

(FROM USCE "DESIGN OF SMALL DAMS" - FIG. 1, p. 29 BASED ON HYDROMETEOROLOGICAL REPORT N° 33 - U.S. WEATHER BUREAU / US CORPS OF ENGINEERS)

b) ASSUME MOST INTENSE 30 MIN PERIOD RAINFALL ≅ 40% OF THE TOTAL 6-HR RAINFALL (USACE 43% - USBR/SCS 37%).

∴ PMP FOR 30 MIN. PERIOD ≅ 9.8" (i = 19.6"/hr)

c) ASSUME PMF FOR THIS* D.A. ≅ 70% OF THE ABOVE PMP OR,

PMF ≅ 13.7"/HR ∴ Q_p = 0.52 × 13.7 × 645.3 = 4600 CFS

*NOTE: THIS CORRESPONDS TO USE OF RATIONAL METHOD WITH C ≅ 0.70 TO 0.74

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HYDROLOGIC/HYDRAULIC INSPECTION

PEAT SWAMP RESERVOIR, ANSONIA, CT.

2A) THE DAM IS CLASIFIED OF INTERMEDIATE SIZE WITH HIGH HAZARD POTENTIAL

∴ SDF RECOMMENDED BY GUIDELINES ≅ PMF ≅ 4600 CFS (PEAK INFLOW

3A) EFFECT OF SURCHARGE STORAGE ON MAX. PROBABLE DISCHARGE

a) FOR Q_{P_1} = 4600 CFS (SEE D.SHEN COMPS 5/24/78 p. 5 FOR SPILLW.)

$H_1 \cong 5.83'$, SAY 5.8' (DAM OVERTOPPED BY ± 1.8')

b) VOLUME OF SURCHARGE @ $H_1 \cong 5.8'$

$V_1 = 82.1(5.83 - 0.25) = 458$ AC-FT

$\therefore S_1 = \frac{458}{0.52 \times 53.3} = 16.5" > 15.8"$ (SEE BELOW)

c) ASSUMING THE MPF FLOOD RO IN NEW ENGLAND (SEE GUIDELINE) IS APPROX. EQUAL TO 19", AND THE R.O. IN 6-HR TO BE 83% OF THE 24 HR RO, OR, 15.8", THE PEAK OUTFLOW WILL BE ESTIMATED (SEE GUIDELINES) AS FOLLOWS:

$S_1 = 16.5" > 15.8"$ (TOT. R.O.) ∴ ASSUME $S_{AVE} = \frac{16.5}{2} = 8.3"$

$\therefore Q_{P_3} \cong 4600\left(1 - \frac{8.3}{15.8}\right) \cong \underline{2200}$ CFS

$H_3 \cong \underline{5.0'}$ (ABOVE SPILLW. CREST)

DAM OVERTOPPED ± 1 FT.

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NOTE:

THESE COMPUTATIONS HAVE BEEN PERFORMED BASED UPON A DAM BREACH WITH A SURCHARGED WATER SURFACE ELEVATION. IN ACCORDANCE WITH NORMAL CORPS PROCEDURES, COMPUTATIONS ARE PERFORMED BASED UPON A WATER SURFACE ELEVATION AT THE TOP OF THE DAM. A DAM BREACH WITH THE WATER SURFACE AT THE TOP OF THE DAM AND WITHOUT HEAVY DOWNSTREAM CHANNEL FLOW COULD BE MORE CRITICAL THAN A DAM BREACH WITH A SURCHARGE. THE DIFFERENCE, IN THIS CASE, IS NOT SUBSTANTIAL.

APPENDIX

SECTION E: INVENTORY OF DAMS IN THE UNITED STATES

INVENTORY OF DAMS IN THE UNITED STATES

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(1) STATE	(2) IDENTITY NUMBER	(3) DIVISION	(4) STATE	(5) COUNTY	(6) CONGR DIST.	(7) STATE	(8) COUNTY	(9) CONGR DIST.	(10) NAME	(11) LATITUDE (NORTH)	(12) LONGITUDE (WEST)	(13) REPORT DATE DAY	MO	YR
CT	00085	NED	CT	009	05				PEAT SWAMP RESERVOIR DAM	1222.0	73035.0	10	DEC	73

(15) POPULAR NAME	(16) NAME OF IMPOUNDMENT
BEAVER LAKE	PEAT SWAMP RESERVOIR

(17) REGION	(18) BASIN	(19) RIVER OR STREAM	(20) NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	(21) DIST FROM DAM (MI.)	(22) POPULATION
01	07	BEAVER BROOK	ANSONIA	2	24100

(23) TYPE OF DAM	(24) YEAR COMPLETED	(25) PURPOSES	(26) STRUCTURAL HEIGHT (FT.)	(27) HYDRAULIC HEIGHT (FT.)	(28) IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	NORMAL (ACRE–FT.)
RECB	1889	S	45	43	1900	1760

(29) REMARKS

(30) D/S HAS	(31) SPILLWAY CREST LENGTH	TYPE	WIDTH (FT.)	(32) MAXIMUM DISCHARGE (FT.)	(33) VOLUME OF DAM (CY)	(34) POWER CAPACITY INSTALLED (MW)	PROPOSED (MW)	(37) NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
	500		25					0								

(40) OWNER	(41) ENGINEERING BY	(42) CONSTRUCTION BY
ANSONIA-DERBY WATER CO		

(43) REGULATORY AGENCY DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE

(53) INSPECTION BY	(54) INSPECTION DATE DAY	MO	YR	(55) AUTHORITY FOR INSPECTION
DEPT ENV PROT	22	MAR	73	PA 571 SECT 25-11 ST OF CT

(56) REMARKS

E-1